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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Yong Hwan Jeong et al.

Docket No.: 01-699

Serial No.:

Examiner :

Filed :

Art Unit :

For : ZIRCONIUM ALLOY HAVING EXCELLENT CORROSION  
RESISTANCE AND MECHANICAL PROPERTIES AND METHOD FOR  
PREPARING NUCLEAR FUEL CLADDING TUBE BY  
ZIRCONIUM ALLOY

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1c872 U.S. PTO  
10/040743



INFORMATION DISCLOSURE STATEMENT

Hon. Commissioner of Patents & Trademarks  
United States Patent & Trademark Office  
Washington, D.C. 20231

Dear Sir:

In accordance with the requirements of 37 CFR 1.97 and 1.98,  
Applicants hereby submit the prior art listed hereinbelow, copies  
enclosed.

- (1) U.S. Patent No. 5,230,758 entitled METHOD OF PROCESSING  
ZIRLO MATERIAL FOR LIGHT WATER REACTOR APPLICATIONS, By  
Foster et al., patented July 27, 1993. This patent  
discloses an alloy comprising, by weight percent, 0.5-  
2.0 niobium, 0.7-1.5 tin, 0.07-0.14 iron, and 0.03-0.14  
of at least one of nickel and chromium, and at least  
0.12 total of iron, nickel and chromium, and up to 220  
ppm C, and the balance essentially zirconium.

Preferably, the alloy contains 0.03-0.08 chromium, and 0.03-0.08 nickel. The alloy is also preferably subjected intermediate recrystallization anneals at a temperature of about 1200°-1300° F., and to a beta quench two steps prior to final size.

- (2) U.S. Patent No. 6,125,161 entitled METHOD FOR MAKING ZR ALLOY NUCLEAR REACTOR FUEL CLADDING HAVING EXCELLENT CORROSION RESISTANCE AND CREEP PROPERTIES, By Isobe et al., patented September 26, 2000. This patent discloses a method for making Zr alloy nuclear REACTOR fuel cladding having excellent corrosion resistance and creep properties. The method includes performing hot forging, solution heat treatment, hot extruding, and repeated cycles of annealing and cold rolling of a Zr alloy including; by weight, 0.2 to 1.7% Sn, 0.18 to 0.6% Fe, 0.07 to 0.4% Cr and 0.05 to 1.0% Nb, with the remainder being Zr and incidental impurities, and the incidental nitrogen impurity content being 60 ppm or less, and then performing final stress relief annealing thereon. The annealing is performed at a temperature of 550°C. to 850°C. for 1 to 4 hours such that the accumulated annealing parameter  $\sum A_i = \sum t_i \cdot \exp(-40,000/T_i)$  satisfies relationships  $-20 \leq \log \sum A_i \leq -15$ , and  $-18-$

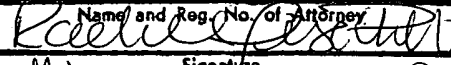
$10 \cdot X_{Nb} \leq \log \sum A_i \leq -15 - 3.75 \cdot (X_{Nb} - 0.2)$ , wherein  $A_i$  represents the annealing parameter for the I-th annealing,  $T_i$  represents the annealing time (hours) for the I-th annealing,  $T_i$  represents the annealing temperature (K) for the I-th annealing, and  $X_{Nb}$  concentration (wt %).

- (3) U.S. Patent No. 5,838,753 entitled METHOD OF MANUFACTURING ZIRCONIUM NIOBIUM TIN ALLOYS FOR NUCLEAR FUEL RODS AND STRUCTURAL PARTS FOR HIGH BURNUP, By Van Swam et al., patented November 17, 1998. This patent discloses a process for fabricating nuclear fuel rod cladding tube comprising beta quenching a zirconium alloy billet consisting essentially of from 0.5 to 3.25 weight percent niobium, from 0.3 to 1.8 weight percent tin, the balance of the alloy being essentially nuclear grade zirconium with incidental impurities by heating to a temperature in the beta range above 950° C. and rapidly quenching the billet to a temperature below the  $\alpha$  plus  $\beta$  to  $\alpha$  transformation temperature to form a martensitic structure; extruding the beta-quenched billet at a temperature below 600° C. to form a hollow; annealing the hollow by heating at a temperature up to 590° C.; pilgering the annealed hollow; and final annealing the pilgered annealed hollow to a temperature

up to 590°C. to form the nuclear fuel rod cladding tube comprising the alloy having a microstructure of beta niobium second phase precipitates distributed uniformly intragranularly and intergranularly forming radiation resistant second phase precipitates in the alloy matrix.

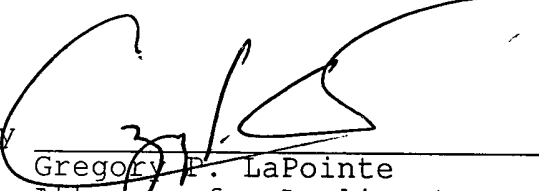
The undersigned submits the above-identified references for independent consideration by the Examiner and does not make any admission that these references are or are not material to the present invention or that these references are or are not prior art with respect to the present invention.

I hereby certify that this correspondence is being  
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on November 1, 2001  
(Date of Deposit)  
Rachel Piscitelli  
Name and Reg. No. of Attorney  
  
Signature  
November 1, 2001  
Date of Signature

Respectfully submitted,

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